RESEARCH PROBLEM STATEMENT

Problem Title: Programming of Strong Ground Motion Instrumentation of New Bridges

No.: 05.07-2 (also 05.08-2)

Submitted By: Marv Halling, USU

E-mail: halling@cc.usu.edu

1. Briefly describe the problem to be addressed:

As new bridges are being constructed, the need for faster construction, more economical designs, and longer lasting infrastructure is becoming more and more important. These issues are paramount at the national level with FHWA Initiatives such as the "Bridge of the Future" and "Smart Structures." In order to improve the performance of modern structures, instrumentation and monitoring of representative structures is necessary. This problem statement addresses the need to install and maintain strong motion (earthquake) instrumentation as well as additional instrumentation.

2. List the research objective(s) to be accomplished:

1. To plan, design, and install long term monitoring instrumentation in representative structures during construction.

2. To place sensors in bridge and foundation systems that will be useful in detecting degradation of the structural component.

3. To establish procedures where bridges are selected and designated for various types of instrumentation.

3. List the major tasks required to accomplish the research objective(s): **Estimated person-hours**

1. Study the recommendations of FHWA, and take a survey of the approaches of other state DOTs.

2. Establish criteria for the selection of instrumentation and bridges to be instrumented.

3. Design of the instrumentation packages for one or two selected bridges on Legacy Highway.

4.

4. Outline the proposed schedule (when do you need this done, and how we will get there):

This project is anticipated to have a duration of approximately 1 year. The duration of one year is noted to allow for the flexible Legacy Highway schedule.

5. Indicate type of research and / or development project this is:

Large: ☐ Research Project ☐ Development Project

Small: X Research Evaluation ☐ Experimental Feature ☐ New Product Evaluation ☐ Tech Transfer Initiative ☐ Other

6. What type of entity is best suited to perform this project (University, Consultant, UDOT Staff, Other Agency, Other)?

7. What deliverable(s) would you like to receive at the end of the project? (e.g. useable technical product, design method, technique, training, workshops, report, manual of practice, policy, procedure, specification, standard, software, hardware, equipment, training tool, etc.)

The deliverable would be a set a guidelines regarding instrumentation of UDOT structures. Recommended prioritization of proposed instrumentation locations. Develop standard drawings, specifications and details for installation of instrumentation. Estimated cost per array.

8. Describe how will this project be implemented at UDOT.

It is anticipated that the initial project will be funded by the research division, with guidelines for long term future funding coming from construction funds for new construction and from repair funds.

9. Describe how UDOT will benefit from the implementation of this project, and who the beneficiaries will be.

The beneficiaries at UDOT will be the engineers charged with observation and maintenance of UDOT bridges.

10. Describe the expected risks, obstacles, and strategies to overcome these.

The main obstacle will be funding the longer term program. With interest in improved performance requirements for new construction, the monitoring of bridges will become a necessary construction cost. These expenses will be extremely small compared to construction budgets.

11. List the key UDOT Champion of this project (person who will help Research steer and lead this project, and will participate in implementation of the results): Jim Higbee, UDOT

12. Estimate the cost of this research study including implementation effort (use person-hours from No. 3): $ 30,000.

13. List other champions (UDOT and non-UDOT) who are interested in and willing to participate in the Technical Advisory Committee for this study:

Name	Organization/Division/Region	Phone	Attended UTRAC?
A Todd Jensen, UDOT			
B) Jon Bischoff, UDOT			
C) Boyd Wheeler, UDOT			
D) Paul Barr, USU			
E) Keri Ryan, USU			
F) Steve Bartlett, UU			
G) Jim Bay, USU			

14. Identify other Utah agencies, regional or national agencies, or other groups that may have an interest in supporting this study:

UU Seismic Stations, USGS, UGS, ANSS Program, FHWA